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ABSTRACTS FROM THE ORIGINAL PAPERS.

On the Differences between the Oryzenin of Common and Glutinous Rice.

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It is widely known that the difference between common and glutinous rice is caused by the different physico-chemical properties of the starches found in the two varieties while the quantitative differences of fat and protein contents have also been reported. Many authors investigated on rice proteins and distinguished four different kinds i. e. albumin, globulin, prolamin and glutenin which last is called oryzenin in the case of rice. Also many kinds of amino-acids in their decomposition products have been described. But until recently, there has been no report stating the difference between these two varieties of rice in respect to physico-chemical properties of oryzenin. Recently Kondo investigated only on the optical properties of rice protein which was extracted by alkalins and reported that the protein of common rice is more compact optically than that of glutinous.

The authors undertook the following experiments on many samples of both kinds of rice which were produced in diferent parts of Japan. (A) The distribution of these four kinds of protein, albumin, prolamin, globulin and oryzenin was determined quantitatively. (B) Physico-chemical investigations were undertaken on pure oryzenin which had been freed from albumin, globulin and prolamin. From these experiments, the authors found out many characteristic differences between common and glutinous rice oryzenin and here those results will be stated briefly.

(A) The chemical characteristics of oryzenin.

(1) On the distribution of four kinds of protein in both kinds of rice, the oryzenin contents predominate in glutinous rice.

(B) The physicochemical characteristic properties of oryzenin.

(1) The pure oryzenin contains from 0.291 to 0.599% of ash but in common rice oryzenin the ash content is always greater.

(2) The iso-electric point of glutinous rice oryzenin is more acidic than that of common, i. e. that of the former is in pH 4.8–5.2 and that of the latter is in pH 5.2-5.8.

(3) The solubility of glutinous rice oryzenin in alkali solution is greater than that of common rice oryzenin and the alkali solution of the latter is more turbid than that of the former.

(4) The viscosity of glutinous rice oryzenin in alkali solution is a little less than that of common rice oryzenin solution and the decrease of viscosity of the former by time is more pronounced than that of the latter.

(5) The rotatory power of glutinous rice oryzenin solution is lower than that of common rice. · When this alkali solution was illuminated by ultraviolet rays its rotatory power decreases more rapidly in the case of the former.

(6) On the elemental composition of oryzenin, the nitrogen contonts of common rice is higher than that of glutinous rice. The difference is not only in the nitrogen contents but also in the sulphur and phosphorous contents which are reversed in the two kinds of oryzenins, i. e. the S–content of common rice oryzenin predominates and the P–content of glutinous rice oryzenin predominates.

Further difference was observed in their elemental composition. If the ratio of carbon for oxygen was taken, that of glutinous rice oryzenin is lower than that of common rice.

(7) In the partition of amino–acids in hydrolytic products of oryzenin, ammonia–, argimin– and lysin–form nitrogen are predominant in common rice oryzenin while monoamino–, histidin– and cystin–form nitrogen predominate in glutinous rice oryzenin.

(8) There is no remakable difference in tyrosin and tryptophan contents between the hydrolytic products of common and glutinous rice oryzenin.

(9) The iodine contents of oryzenin–iodide is superior in glutinous rice oryzenin in comparison with that of common.

(10) The free amino nitrogen content of common rice oryzenin is greater than that of glutinous and when the oryzenin alkali solution was illuminated by ultra-violet ray, the free amino nitrogen contents of glutinous rice oryzenin increased

more easily than that of common.

(11) In the pancreatin digestion of oryzenin, the glutinous rice oryzenin is digested more easily than that of common.

(12) The silver salt of glutinous rice oryzenin contains more silver than that of common but the nitrogen content is the reverse.

(13) The combined HCl-quantity of common rice oryzenin is greater than that of glutinous, because the former contains more amino groups in its molecule than the latter.

(14) The refractive index of common rice oryzenin is higher than that of glutinous.

(15) The contents of acetyl-group and of nitrogen in acetyl oryzenin are quite different between common and glutinous rice oryzenin, the former being superior in nitrogen contents and inferior in acetyl-group while the latter is the reverse.

(16) In the decomposition products of acetyl oryzenin, the common rice oryzenin produces great quantities of base, pyrrol, pyrrolic acid, $H_2OK_2CO_3$ soluble substances while the glutinous produces large quantities of pyrrolidin, glyoxalin and protcol.

Studies on Proteins. (The preliminary report)

(Contribution No. I from the Laboratory of Nutritional Chemistry, Department of Agricultuve, Kyoto Imp. University)

By Kinsuke KONDO.

A. In the writer's opinion, it is not right in the views of endeavouring to elucidate the essential or all nature and behavior of the colloidal solutions as those of proteins by the capillary chemistry, and also not by the physical chemistry nor pure chemistry only, rejecting the capillary chemical consideration. Of course we can find many phenomena, which should be elucidated from the physico-chemical views, in the case of emulsoids such as protein solutions, whose nature is near to the real solutions.

We must, therefore, deal with protein solutions, on the one hand, by stoichiometrical and physico-chemical measurements and particularly by the developement of more exact analytical procedures, and on the other hand, endeavour to elucidate

the results of measurements under colloidal chemical as well as purely chemical consideration. This, the writer believes, is important on the progress of the protein chemistry.

B. The theory enounced by F. G. Donnan concerning the state of equilibrium in the case of semi-permeable membranes has been explained, for purposing to get a general conception of this theory.

C. It must be determined through the measurements of $[H^{\cdot}]$, in what way $[H^{\cdot}]$ varies, when the amount of NaOH per g-equivalent of casein nitrogen varies with constant amount of NaCl and constant volume. If we take the amount of NaOH (expressed in g-equivalent), which bound to g-equivalent of casein nitrogen, as ordinate, and $[H^{\cdot}]$ (perhaps expressed in log-function) as abscissa, we can get some curves, each of these, corresponding to a certain NaCl-concentration.

When we get the full analytical results of our solutions, under using the above curves we can calculate in what way NaOH distributes between casein and dispersion medium. Applying these curves and the Donnan's theory to the results of measurements of osmotic pressure, the writer has shown that we can theoretically and experimentally find the molecular weight of casein.

(May 17, 1925)

A Method for the Preparation of Fumaric and Succinic Acids.

By

Teizo TAKAHASHI and Kinichiro SAKAGUCHI.

The ordinary method for the preparation of fumaric acid is to heat malic acid at 140–150°C for a long time. Recently Carl Wehmer patented (Brit. Patent 14641. Jonrn. of chem. Soc. No. 710. Dec. 1921) a benefit way to prepare this acid from sugar by the fermentation of Asper. fumaricus (Asp. javanicus).

The authors, as reported already, have found out the conditions optimum for the formation of fumaric acid by Rhizopus species, although C. Wehmer and F. Ehrlich have mentioned the formation of the acid by the other species of the same germs.

On the preparation of succinic acid suitable for the large produce few methods may be mentioned such as :- First, by the dry distillation of amber, secondly by the fermentation of Ca-malate with putrified casein (Liebig), thirdly by the fermentaion of am-tartarate (König), fourthly by the bacterial fermentation of citrate (U. Terada), fifthly by the oxydation of glutamic acid with nitric acid in presence of vanadinm (U. Suzuki, Y. Matsuyama).

Authors have prepared this acid most profitably by the reduction of fumaric acid, which is prepared from starch.

Experimental.

Fumaric acid preparation.

Fungus :- Rhizopus G. 34. Yamazaki.

The medium for the culture :- Water 1000g, Starch 100g, K_2HPO_4 0.015g, KH_2PO_4 0.015g, $MgSO_4$ 0.010g, $CaCl_2$ 0.010g, Urea 5g, Ca-carbonate 50g, Fe_2Cl_6 and NaCl trace.

In the medium after 23 days culture at 26–30°C, the yield was :-

Crude Ca-fumarate	43.7g.
Free fumaric acid	33.47g.
and Starch, decomposed	83.7g.

In other instance with the same fungus in the same medium replacing glucose (100g.) and peptone (3g.) respectively instead of both starch and urea after 29 days culture the yield was 31.5g. as crude Ca-fumarate, i. e. 20.2g. as free fumaric acid and there was no sugar remained in the culture medium.

So the yield of the acid from starch is 39%, calculated from used raw material. The yield from glucose was low by this instance but it may be increased up to even more than 35%, if we minimanise the amount of peptone as we have reported already.

Succinic acid preparation.

For the preparation of the succinic acid from fumaric acid, an electrical reduction with lead pole was most suitable. Free acid is reduced completely after 30 minutes in 0.2% olution in water or 5% in alcohol, by passing the current of 6 volt and 1 amphere. Ca-fumarate may subjected in the same current in 1% solution in water to complete the reduction in 50 minutes.

The yield of succinic acid from starch may attain even over 35%.

[This paper is read before the meeting held at Tokyo Imp. Uni. Agric. Fact. Oct. 1924.]

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[illegible] [illegible] the fermentation of pentoses [illegible] [illegible]

[illegible] the fermentation of [illegible] would [illegible] the [illegible] may be considered more sure. Thus, by the dry distillation [illegible] fermentation of [illegible] [illegible] [illegible] of any [illegible] [illegible] in the [illegible] [illegible] [illegible] [illegible] by the [illegible] of [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] by the [illegible] of [illegible] [illegible] which is prepared from starch.

Experimental

[illegible]

[illegible] [illegible] of the [illegible]

The medium for the cultivation: [illegible]

In the medium after 10 days culture at [illegible], the yield was

Crude Ca-lactate	[illegible]
Free lactic acid	[illegible]
and lactic anhydride	[illegible]

In other [illegible] with the same [illegible] in the same medium [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] the yield was [illegible]

[illegible] the yield of the [illegible] [illegible]